

**PROCESS FOR THE PRODUCTION OF HIGH QUALITY MIDDLE
DISTILLATES FROM MILD HYDROCRACKERS AND VACUUM GAS OIL
HYDROTREATERS IN COMBINATION WITH EXTERNAL FEEDS IN THE
MIDDLE DISTILLATE BOILING RANGE**

ABSTRACT OF THE DISCLOSURE

In the refining of crude oil, vacuum gas oil hydrotreaters and hydrocrackers are used to remove impurities such as sulfur, nitrogen, and metals from the crude oil. Typically, the middle distillate boiling material (boiling in the range from 250°F-735°F) from VGO hydrotreating or moderate severity hydrocrackers does not meet the smoke point, the cetane number or the aromatic specification. In most cases, this middle distillate is separately upgraded by a middle distillate hydrotreater or, alternatively, the middle distillate is blended into the general fuel oil pool or used as home heating oil. With this invention, the middle distillate is hydrotreated in the same high pressure loop as the vacuum gas oil hydrotreating reactor or the moderate severity hydrocracking reactor. The investment cost saving and/or utilities saving are significant since a separate middle distillate hydrotreater is not required. A major benefit of this invention is the potential for simultaneously upgrading difficult cracked stocks such as Light Cycle Oil, Light Coker Gas Oil and Visbroken Gas Oil or Straight-Run Atmospheric Gas Oils utilizing the high-pressure environment required for mild hydrocracking.

Figure 1

